

CLAIMS

We claim:

1. A highly efficient, passive separator for separating matter from a fluid flow comprising:

5 input means for receiving said fluid flow;

 passive guiding means coupled to said input means for guiding said fluid flow into a rotating flow, said rotating flow causing a centrifugal force to force said matter in a direction tangentially outward from said rotating flow;

10 transfer means coupled to a storage means for capturing said matter centrifugally forced in a direction tangentially outward from said rotating flow and guiding said matter into said storage means, wherein said storage means prevents said matter from reentering said rotating fluid flow;

15 output means for allowing said rotating fluid flow to escape said separator, wherein said escaped rotating fluid flow comprises a lesser concentration of said matter than in said fluid flow.

2. A separator in accordance with claim 1, wherein said input
20 means is in the form of a pipe.

3. A separator in accordance with claim 1, wherein said input means is in the form of a pipe having a ninety-degree bend.

4. A separator in accordance with claim 1, wherein said passive guiding means comprises:

a cylinder coupled perpendicularly to said input means.

5. A separator in accordance with claim 1, wherein said passive guiding means comprises:

a cylinder wherein said fluid flow rotates around said
5 cylinder thereby creating said rotating fluid flow.

6. A separator in accordance with claim 1, wherein said passive guiding means comprises:

a central air guide disposed within said input means, the
space between said central air guide and said input means
10 forming a cavity; and

at least one curved vane disposed on said central air guide
such that as said fluid flows through said cavity, it becomes
said rotating fluid flow.

7. A separator in accordance with claim 2, wherein said passive
15 guiding means comprises:

a central air guide disposed within said input means, the
space between said central air guide and said input means
forming an annulus; and

at least one curved vane disposed on said central air guide
20 such that as said fluid flows through said annulus, it becomes
said rotating fluid flow.

8. A separator in accordance with claim 1 wherein said transfer
means is a slot.

9. A separator in accordance with claim 1 wherein said transfer means is an opening such that said matter centrifugally forced in a direction tangentially outward from said rotating fluid flow can pass therethrough.
- 5 10. A separator in accordance with claim 1 wherein said storage means is a box.
11. A separator in accordance with claim 1, wherein said storage means further comprises an opening.
12. A separator in accordance with claim 1, wherein said
10 storage means further comprises an opening for emptying said matter stored in said storage means.
13. A separator in accordance with claim 1, wherein said output means comprises a pipe.
14. A separator in accordance with claim 1, wherein said fluid
15 flow comprises air.
15. A separator in accordance with claim 1, wherein said fluid flow comprises a gas.
16. A separator in accordance with claim 1, wherein said fluid flow comprises water.
- 20 17. A separator in accordance with claim 1, wherein said fluid flow comprises a liquid.
18. A separator in accordance with claim 1, wherein said matter is dust.

19. A separator in accordance with claim 1, wherein said matter is in solid form.

20. A separator in accordance with claim 1, wherein said matter is a liquid.

5 21. An efficient, passive separator utilizing cyclonic separation, said separator comprising:

an input pipe for receiving a fluid flow having a concentration of particulates;

10 a cylinder enclosed within a housing, wherein said input pipe is coupled to said housing and further wherein said fluid flow is tangential to the lateral sides of said cylinder, and further wherein said fluid flows around said lateral sides of said cylinder, thereby becoming a rotating fluid flow;

15 an opening substantially parallel to the lateral sides of said cylinder;

a container coupled to said opening;

an output pipe coupled to said housing; and

20 wherein centrifugal force forces at least some of said particulates through said opening and into said container, thereby allowing said rotating fluid flow to escape said output pipe having a substantially reduced concentration of particulates.

22. A separator according to claim 21, wherein said input pipe comprises a substantially ninety degree bend.

23. A separator according to claim 21, wherein said container comprises means to allow emptying particulate matter therefrom.
24. A separator according to claim 23 wherein said means to allow emptying comprises a second opening.
- 5 25. A separator according to claim 21 wherein said fluid flow comprises air.
26. A separator according to claim 21 wherein said fluid flow comprises a gas.
27. A separator according to claim 21 wherein said fluid flow
10 comprises water.
28. A separator according to claim 21 wherein said fluid flow comprises a liquid.
29. A separator according to claim 21 wherein said particulates constitute matter in the solid form.
- 15 30. A separator according to claim 21 wherein said particulates constitute matter in the liquid form.
31. A separator according to claim 21 wherein said particulates are dust.
32. An efficient, passive separator utilizing swirl tube
20 separation, said separator comprising:
- an input tube to receiving a fluid flow having a concentration of particulates;
- a housing;

a swirl tube coupled to said input tube and said housing
for transforming said fluid flow into a rotating fluid flow;

an opening disposed within said housing substantially
tangent to the direction of rotation of said fluid flow;

5 a container coupled to said opening and said housing,
wherein centrifugal force ejects at least some of said
particulates from said rotating fluid flow through said opening
and into said container;

an output tube coupled to said housing for expelling said
10 rotating fluid flow, wherein said rotating fluid flow has a
substantially reduced concentration of particulates.

32. A separator according to claim 31, wherein said swirl tube
comprises a central air guide having at least one vane disposed
thereon.

15 33. A separator according to claim 31, wherein said container
comprises means to allow emptying particulate matter therefrom.

34. A separator according to claim 33 wherein said means to
allow emptying comprises a second opening.

35. A separator according to claim 31 wherein said fluid flow
20 comprises air.

36. A separator according to claim 31 wherein said fluid flow
comprises a gas.

37. A separator according to claim 31 wherein said fluid flow
comprises water.

38. A separator according to claim 31 wherein said fluid flow comprises a liquid.

39. A separator according to claim 31 wherein said particulates constitute matter in the solid form.

5 40. A separator according to claim 31 wherein said particulates constitute matter in the liquid form.

41. A separator according to claim 31 wherein said particulates are dust.

42. A separator according to claim 31 wherein said swirl tube
10 comprises:

a bullet-shaped air guide disposed within a pipe, said pipe being coupled to said input pipe; and

at least one vane coupled to said bullet-shaped air guide.

43. A method for separating comprising the steps of:

15 passively imparting a spin on a fluid flow;

utilizing centrifugal force to separate at least one particulate from said fluid flow; and

capturing said at least one particulate and storing said particulate such that it cannot reenter said fluid flow.

20 44. A method according to claim 43 wherein said step of passively imparting is performed by a cyclonic separator.

45. A method according to claim 43 wherein said step of passively imparting is performed by a swirl tube.